science

social studies

A Landfill Is No Dump!

Objective

To teach students where garbage goes and explain the difference between unlined trash "dumps" of the past and today's specially designed landfills.

Activity Description

Students will construct models of an old-fashioned "dump" and a modern landfill in class and observe their differences.

Materials Needed

- Two plastic colanders (9 inches wide by 4 inches deep)
- Two cake pans (9 inches)
- One 10-pound bag of garden soil
- One 32-ounce bottle of distilled water
- Small pieces of typical home-generated garbage (see below)
- One package of modeling clay
- One roll of colored (red) crepe paper
- Clear tape
- One measuring cup
- One pair of scissors
- One package or roll of litmus (pH) paper
- One copy of the *Landfill Log* worksheet for each student

Key Vocabulary Words

Organic
Municipal solid waste
Landfill
Leachate
Groundwater
Turbidity
pH

Duration

Landfill creation: 1 hour
Observation over 4 weeks: 15 to 20 minutes each week

Skills Used

Observation/classification
Problem solving

Activity

Step 1: Photocopy and distribute *Landfill Log* worksheets to each student. Bring in some small pieces of garbage from your home, such as potato peels, apple cores, newspaper, and plastic yogurt containers. Introduce the following topics or concepts (refer to the Teacher Fact Sheets titled *Solid Waste* on page 41 and *Landfills* on page 155 for background information):

- Trash generation and disposal.
- How trash has been disposed of in the past and how it is disposed of now.
- Explain, in general terms, how a landfill works.
- Define each of the key vocabulary words used in the lesson.

Journal Activity

Ask students to write a haiku or sonnet about where their garbage goes.

Step 2: Begin the exercise by asking a student volunteer to line one colander with flattened modeling clay, patting it out flat like a pie crust. Explain that this represents the liner of a sanitary, modern landfill. Do not line the second colander. Note that it represents an old-fashioned, unsanitary dump.

Step 3: Have several students cut the different garbage items you brought in from home into small pieces, about 2 inches square.

Step 4: Have a few student volunteers place this trash and the garden soil in the colanders in alternate layers until the colanders are full. For each layer, add 1 inch of garbage covered by 1/4 inch of dirt. Add several strips of red crepe paper as one layer toward the bottom of the colanders and cover them with more dirt. (The red crepe paper will emphasize the seepage of water through the unlined dump.)

Step 5: Place cake pans under the colanders to collect the seepage.

Step 6: Have students simulate "rain" on the "landfills" by pouring 1 cup of water onto each colander twice a week for 4 weeks. Ask students to observe the changes that take place. Pay particular attention to any water that collects in the cake pans. The unlined colander's seepage should be observable and colored by the crepe paper. The lined colander should not leak.

Step 7: After every "rain" session, have the students use a measuring cup to measure the water that leaked out of the unlined colander. Have students observe and record the water's color and turbidity. Ask for volunteers to test the pH of the collected water with litmus paper. Ask students to record results and observations in their *Landfill Logs*. For comparison purposes, have students test and record the pH of the distilled water.

Step 8: Next, have student volunteers put the "dirty" water from the unlined colander in a plastic cup. Fill another plastic cup with distilled water.

Step 9: Ask students to pretend that the dirty water or "leachate" had escaped an unlined landfill and reached surrounding plants and animals. Ask them what effect they think the liquid would have on animal or plant life. Ask students to predict how a piece of celery (representing a plant) would react to the leachate or "dirty" water.

Step 10: Insert two pieces of celery—one into the leachate cup and one into the distilled water cup. Point out to students how the celery stalk absorbs all of the color from the crepe paper, or dirt and toxins, of the leachate. Have students record observations about the process and the differences between the two pieces of celery.

Assessment

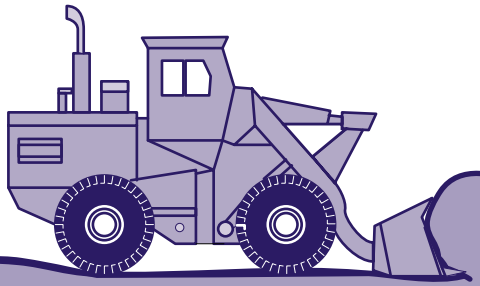
1. Ask students to explain the differences between the mini-landfills.
2. Ask students to refer to their *Landfill Logs*. How did the color, turbidity, and pH of the leachate and the distilled water differ? Why?
3. Have students describe how an unlined landfill or "dump" can pollute ground water and surrounding soil.
4. Ask students to decide which landfill is better for the environment and why. Which kind of disposal facility would they rather have in their neighborhood?
5. Ask students to define the key vocabulary words of this lesson. Conduct a spelling bee using these words.

Enrichment

1. Take a field trip to a local landfill. Have kids tour the facility and learn firsthand how it operates. When you return, have students write a paragraph about their visit, including five new facts about landfills that they learned.
2. Contact your state solid waste or environmental agency to find out how many landfills are in your state. If one is located near you, ask how many tons of trash it accepts per day or per year and its lifetime maximum capacity. Have students use data obtained from the agency to calculate how quickly the landfill is filling up. Have students make graphs to show how much longer it can accept garbage at its current rate.

Landfill Log

Name: _____



Observations

Date	Amount of Leachate	pH of Leachate	pH of Distilled Water	Color of Leachate	Turbidity of Leachate	Celery in Leachate (one-time observation)	Celery in Distilled Water (one-time observation)
Week 1 Rain 1 Rain 2	½ cup	9	7	brown and red	murky and filled with particles		
Week 2 Rain 1 Rain 2							
Week 3 Rain 1 Rain 2							
Week 4 Rain 1 Rain 2							